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BEFORE THE BOARD OF OIL, GAS AND MINING
DEPARTMENT OF NATURAL RESOURCES
STATE OF UTAH

IN THE MATTER OF THE REQUEST FOR AGENCY ACTION OF LIVING RIVERS TO APPEAL THE DECISION BY THE DIVISION OF OIL, GAS AND MINING TO APPROVE THE APPLICATION OF EARTH ENERGY RESOURCES TO CONDUCT TAR SANDS MINING AND RECLAMATION OPERATIONS AT THE PR SPRINGS MINE	**NOTICE OF FILING OF TECHNICAL TESTIMONY OF ELLIOTT W. LIPS** **Docket No. 2010-027** **Cause No. M/047/0090 A**

Living Rivers, by and through its attorneys, hereby files the prepared supplemental testimony of Elliott W. Lips in the above matter.

Dated: February 15, 2011.

ROB DUBUC
JORO WALKER
Attorneys for Living Rivers

CERTIFICATE OF SERVICE

I hereby certify that on this 15th day of February, 2011, I served a true and correct copy of this prepared direct testimony of Elliott W. Lips to each of the following persons via email:

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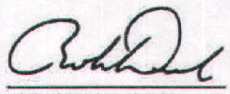


ROB DUBUC

IN THE MATTER OF THE REQUEST FOR AGENCY ACTION OF LIVING RIVERS TO APPEAL THE DECISION BY THE DIVISION OF OIL, GAS AND MINING TO APPROVE THE APPLICATION OF EARTH ENERGY RESOURCES TO CONDUCT TAR SANDS MINING AND RECLAMATION OPERATIONS AT THE PR SPRINGS MINE	:	Docket No. 2010-027 Cause No. M/047/0090 A

PREPARED SUPPLEMENTAL TESTIMONY

OF

ELLIOTT W. LIPS

ON BEHALF OF

LIVING RIVERS

February 14, 2011

I. INTRODUCTION

Q. PLEASE STATE YOUR NAME?

A. My name is Elliott W. Lips

Q. BY WHOM ARE YOU EMPLOYED AND WHAT IS YOUR POSITION?

A. I am the principal engineering geologist of Great Basin Earth Science, Inc. located at 2241 East Bendemere Circle, in Salt Lake City, Utah.

Q. FOR WHOM ARE YOU TESTIFYING IN THIS PROCEEDING?

A. I am testifying on behalf of Living Rivers.

Q. DID YOU PREVIOUSLY PREPARE TESTIMONY FOR THIS PROCEEDING?

A. Yes, it was titled: Prepared Direct Testimony of Elliott W. Lips on behalf of Living Rivers, dated January 7, 2011.

Q. IN PREPARING THIS SUPPLEMENTAL TESTIMONY, WHAT DOCUMENTS HAVE YOU REVIEWED?

A. In addition to the documents listed in my direct testimony (and the documents referenced within them), I have reviewed the following:

Prepared Direct Testimony of Charles H. Norris on behalf of Living Rivers, January 7, 2011.

Expert Report of Robert J. Bayer, JBR Environmental Consultants, Inc, Living Rivers v. Division of Oil Gas and Mining, February 1, 2011. (hereafter, Bayer)

Expert Report of Karla Knoop, JBR Environmental Consultants, Inc, Living Rivers v. Division of Oil Gas and Mining, February 1, 2011. (hereafter, Knoop)

Holmes, W.F., and Kimball, B.A., 1987, Ground water in the Southeastern Uinta Basin, Utah and Colorado: U.S. Geological Survey Water Supply Paper 2248.

Q. WERE YOU PRESENT AT THE DEPOSITION OF THE DIVISION OF OIL, GAS & MINING (DOGM) ON FEBRUARY 2, 2011?

A. Yes and I have also reviewed the transcript from that deposition.

II. PURPOSE AND SUMMARY OF TESTIMONY

Q. WHAT IS THE PURPOSE OF YOUR SUPPLEMENTAL TESTIMONY?

A. My testimony will provide further evidence that Earth Energy Resources' (EER) Notice of Intention to Commence Large Mining Operations (NOI) for the PR Spring Mine that was submitted to DOGM in May, 2009 (approved on September 19, 2009) was not complete and accurate.

Q. WOULD YOU PLEASE SUMMARIZE YOUR TESTIMONY?

A. My testimony will focus on five areas. First, EER's assumption that infiltration of precipitation through the backfilled pits and waste dumps is not anticipated is in direct conflict with the published literature, existing field evidence, the opinions of DOGM technical staff, and even EER's own admissions. Second, the Ground Water Discharge Permit-by-Rule Demonstration (Demonstration) submitted to the Division of Water Quality (DWQ) by EER failed to provide an accurate description of the current plan of operations and chemicals that will be used in the processing of the tar sands. Therefore, DOGM erred in relying on the *de minimis*

determination by DWQ. Third, as discussed in my direct testimony, EER's NOI does not contain the information on potential impacts to surface and ground water systems that is required by the Rules for Large Mining Operations (R647-4.). Fourth, the reclamation plan submitted in the NOI fails to demonstrate how EER or DOGM can insure that reclamation will comply with the Utah Mined Land Reclamation Act (40-8-12). Fifth, EER has made significant changes to the proposed operation, and as a result, the Permit-By-Rule determination of the DWQ on March 8, 2008 is no longer valid. In addition, EER's letter of February 8, 2011 (attached as Exhibit 1) does not provide enough information for DWQ to make a new determination.

III. SEEPAGE THROUGH THE TAILINGS IN THE PITS AND DUMPS

Q. CAN YOU DESCRIBE THE MATERIALS THAT WILL BE PLACED IN THE BACKFILLED PITS AND WASTE DUMPS?

A. There will be two types of materials placed in the pits and waste dumps. The first material is the overburden/interburden. This will consist of broken sandstones and shales mixed with lesser amounts of fines, with particles varying from fine to coarse rock rubble (run-of-mine) materials potentially as large as one cubic yard (NOI, pg. 37). The second type of material will be the processed sands and fines. EER has referred to these as "processed sand", "waste sand", "produced (clean) sand", "discharged sand", and "tailings"; I prefer the use of the word tailings because not all of the material is sand. According to EER, the processing produces two streams of tailings; a sand size fraction (80%) and a fines fraction (20%) (Demonstration, pg. 8). It is also important that the material that is placed in the pits and dumps (both overburden/interburden

and tailings) will have a higher porosity than the in-place bedrock. EER reports a bulking factor of 30 percent for all material for volume calculations (NOI, pgs. 19, 24).

Q. HOW WILL THE TAILINGS BE PLACED IN THE PITS?

A. I cannot answer that question completely because the NOI is internally inconstant and vague, and also conflicts with the description in the Demonstration. The NOI states that the "sand tails" will be alternately combined (blended) with the overburden/interburden materials resulting in a "bulk replacement material" which, when placed in compactable lifts (compaction primarily from haul trucks) will be a more homogeneous mixture (pg. 19). However, the NOI also says that blended sand/clay fine tailings will be placed in relatively thin lifts (estimated at 1-3 feet) (pg. 19). The Demonstration states that the tailings will be placed back into the open pit and layered with overburden and interburden (pg. 8).

Q. DO THE NOI OR DEMONSTRATION DESCRIBE THE "BLENDING" OR COMPACTION?

A. Neither document describes the blending of the sand/clay fine tailings, or the blending of the sand tails with the overburden/interburden materials resulting in a "bulk replacement material". The NOI only says that compaction of the "bulk replacement material" will be primarily from haul trucks. In addition, the equipment list (Appendix D) does not list any compaction equipment.

Q. DOES THE NOI DISCUSS THE POTENTIAL FOR SEEPAGE OF WATER THROUGH THE TAILINGS IN THE BACKFILLED PITS?

A. The NOI simply reports that drainage of the "bulk replacement material" will be comparable to in-situ materials (pg. 19). I take this to mean the various layers of bedrock that existed prior to mining.

Q. WHAT DOES THE DEMONSTRATION STATE WITH REGARD TO THE POTENTIAL FOR SEEPAGE OF WATER THROUGH THE PITS?

A. The Demonstration states "The processed sand will be dry (10-20 percent moisture content), and because of the low rainfall in the area, breakthrough of infiltrating precipitation to the base of the pit waste deposits is not anticipated to occur." (pg. 12).

Q. DOES EER PROVIDE ANY DATA AND ANALYSIS TO SUPPORT THIS ASSUMPTION?

A. The only data reported to support this assumption is that precipitation in the area is estimated at about 12 inches annually (EER cites Price and Miller, 1975). However, there are no data on the porosity or permeability of the tailings (or any material placed in the pits) and no analyses of seepage of precipitation through the backfilled pits.

Q. IS EER'S UNSUPPORTED ASSUMPTION ABOUT SEEPAGE THROUGH THE TAILINGS IN THE BACKFILLED PIT CONSISTANT WITH THE PUBLISHED LITERATURE?

A. No. EER assumes that there is not enough precipitation to infiltrate through the backfilled pits. One only needs to look at the present condition of precipitation infiltrating into bedrock to evaluate the validity of EER's assumption. First, Price and Miller (1975) report "[t]he principal source of ground-water recharge is precipitation that falls on the high southern rim of the Uinta Basin. Water from rain and melting snow percolates directly, or from streams, into the underlying sedimentary rocks…." (pg. 27). Given that water from rain and melting snow percolates into underlying sedimentary rocks, it can and will percolate through the material that is placed in the backfilled pits and dumps. Furthermore, the Demonstration reports that [t]he Douglas Creek Member forms the uppermost recognized aquifer in the project area…." and "[t]he Douglas Creek Aquifer receives recharge mainly by infiltration of precipitation and surface water in its outcrop area…." (pg. 2). EER acknowledges that the Douglas Creek Member is likely comprised of discontinuous water bearing horizons that discharge in the vicinity of the mine (Bayer, pg. 11). Again, water from precipitation is currently infiltrating to water bearing horizons (aquifers) and there is absolutely no reason to expect that precipitation in the future would not similarly infiltrate into the backfilled pits and waste dumps, especially when considering that the material backfilled in the pits and placed in the dumps will have a higher porosity than the in-place bedrock.

Q. WHAT EVIDENCE IS THERE IN THE RECORD THAT GROUND WATER EXISTS IN SHALLOW, LOCALIZED, ISOLATED, PERCHED AQUIFERS AT OR NEAR THE PROPOSED MINE SITE?

A. The NOI states "[n]earby springs or seeps (shown on Figure 7) provide evidence of very localized, shallow groundwater, likely representing isolated perched aquifers…" (pg. 30). The

Demonstration states that "[t]here are several nearby springs and/or seeps that provide evidence of localized, shallow ground water…." (pg. 2). In addition, EER states that "[i]t is possible that the planned open pits will mine though and remove some isolated water bearing zones that provide recharge to the seeps adjacent to the mine area…" (Bayer, pg. 11).

Q. BASED ON THE INFORMATION IN THE PUBLISHED LITERATURE, AND ON REPRESENTATIONS FROM EER, IS IT YOUR OPINION THAT THE SOURCE OF RECHARGE FOR THESE ISOLATED SHALLOW AQUIFERS IS PRECIPITATION?

A. Yes.

Q. IS YOUR OPINION SHARED BY DOGM?

A. Yes. DOGM stated that the seeps and springs are coming from local lenticular sandy units within the Green River Formation, that they are recharged by precipitation from above, and that there are multiple aquifers that are recharged by precipitation (Depo, pgs. 94-101, 118-131). In addition, DOGM stated that water obviously came from the sky and went into the ground and that ground water had to come from somewhere (Depo, pgs. 295-296).

Q. IS IT YOUR OPINION, BASED ON THE INFORMATION IN THE PUBLISHED LITERATURE, AND ON INFORMATION IN THE RECORD, THAT PRECIPITATION WILL INFILTRATE THROUGH THE TAILINGS IN THE BACKFILLED PITS?

A. For reasons discussed above, I have absolutely no doubt that there is sufficient precipitation for infiltration to occur. The only way that infiltrating water would not reach the bottom of the pits is if the material was impermeable. There is no information in the record on

the porosity or permeability of the materials but given the 30 percent bulking factor, the porosity is certainly higher than the various layers in the existing bedrock. Therefore, it is my opinion that precipitation will, over time, percolate through the material in the pits, including the tailings.

Q. DOES DOGM AGREE WITH THIS?

A. Yes. DOGM states that the material placed in the pits will be much more porous than the existing in-place materials (Depo. pgs. 167-169). In addition, DOGM stated that water will percolate down through the material until it hits the first impermeable layer, probably the bottom of the pit (Id.).

Q. DO YOU HAVE AN OPINION AS TO WHAT WILL HAPPEN ONCE THE WATER INFILTRATES THROUGH THE BACKFILLED MATERIAL, INCLUDING THE TAILINGS, AND REACHES THE BOTTOM OF THE PIT?

A. I cannot say with certainty, but one of three things will happen depending on the porosity and permeability of the bedrock exposed in the bottom and sides of the pits. First, it is possible that water will continue to infiltrate into underlying bedrock. Second, it is possible that water will completely saturate the backfilled material and the top of the saturated surface will rise in elevation until it reaches a layer in the side of the pit with sufficient permeability that water flows into that layer. Third, it is possible that the saturated surface continues to rise until the water flows out of the bedrock lip of the pit. Without information on the specific layers that will be exposed, it is not possible to say which of these scenarios is more or less likely to occur.

Q. DOES DOGM AGREE WITH THIS?

A. Yes. DOGM stated that there would probably be a little bit of filtering (infiltration) in the bottom of the pit and possibly flow out the side, but that flow over the top would be very improbable (Depo. pgs. 187-188).

Q. DOES THE NOI CONTAIN INFORMATION ON THE LAYERS OF ROCK THAT WILL BE EXPOSED IN THE PIT BOTTOM OR SIDES?

A. No.

Q. IS IT REASONABLE TO ASSUME THAT THERE ARE LAYERS THAT WILL BE EXPOSED IN THE SIDES OF THE PITS THAT WATER COULD INFILTRATE INTO THEM?

A. Yes. As discussed above, there are numerous shallow perched aquifers (which EER acknowledges may be impacted by mining [Bayer, pg. 11]). These layers have sufficient porosity and permeability to act as aquifers that recharge the seeps and springs adjacent to the mine. It is reasonable to assume that one, or more, of these could transmit water from the pit if it becomes saturated to their elevation.

Q. REGARDLESS OF WHICH OF THE THREE SCENARIOS IS LIKELY TO OCCUR, WHAT IS THE ULTIMATE FATE OF WATER FROM THE PITS?

A. Ultimately, the water will flow out of the pit and into underlying or adjacent rocks and/or unconsolidated sediment. This water will migrate until it reaches an existing aquifer, or discharges at the ground surface as a new seep or spring.

Q. HOW WILL THE TAILINGS BE PLACED IN THE DUMPS?

A. The tailings will be placed in "tailings containment cells" or "tailings storage cells" constructed of coarse overburden materials in the upper reaches (flattest) areas of the dumps and then filled with commingled sand and fine tailings (NOI, pg. 20). Each cell will be 15-20 feet high. The NOI does not report that the tailings will be compacted.

Q. DOES THE NOI DISCUSS THE POTENTIAL FOR SEEPAGE OF WATER THROUGH THE TAILINGS IN THE DUMPS?

A. No.

Q. DOES THE DEMONSTRATION DISCUSS THE POTENTIAL FOR SEEPAGE OF WATER THROUGH THE TAILINGS IN THE DUMPS?

A. No. In fact, the Demonstration submitted to DWQ by EER does not even mention that tailings will be placed in the dumps.

Q. CAN YOU DISCUSS THE FLOW OF PRECIPITATION THROUGH THE WASTE DUMPS?

A. Similar to what is happening today on the natural ground surface, some of the precipitation (rainfall and snowmelt) that falls on the dump surface will runoff and some will infiltrate. For all the reasons discussed above with the material in the backfilled pits, precipitation will, over time, percolate through the overburden/interburden material and the tailings in the dumps and will reach the bottom of the dumps. At that point, one of two things will happen; either the water will continue to infiltrate into the underlying pre-existing soils and

bedrock, or the water will migrate along the contact of the dumps and the pre-existing surface. Because the permeability of the underlying rock is lower than the materials in the dumps, I think it is more likely that water will flow at the base of the dumps along, or near, the pre-existing surface and ultimately flow out at or near the dump toe as a new seep or spring. Because the toes of the dumps are located at the very edge of the affected area, any water that flows from the toe of the dumps will travel off-site.

Q. DOES DOGM AGREE WITH THIS?

A. Yes. DOGM stated that it is possible for water to migrate to the bottom of the dumps and then run out the toe and then downstream (Depo. pgs. 267-268).

Q. HOW DOES THE MOISTURE CONTENT OF THE TAILINGS AFFECT THE INFILTRATION OF WATER THROUGH THE PITS AND DUMPS?

A. Water will infiltrate through the tailings regardless of the moisture content when they are placed in the pits or dumps. The only effect moisture content has on this process is how long it will take for water to reach the bottom of the pits or dumps. If the initial moisture content of the tailings are low, it will take longer for precipitation to percolate through them; conversely, if the initial moisture content of the tailings are high, rainwater will percolate sooner. As I discussed above, there is sufficient water available from precipitation alone to infiltrate through the tailings and reach the bottom of the pits or dumps.

Q. WILL THE CHEMISTRY OF THE WATER CHANGE AS IT INFILTRATES THROUGH THE MATERIALS IN THE PITS AND DUMPS?

A. Absolutely. As precipitation migrates through the materials in the pits there will be an increase in total dissolved solids (TDS). In addition, any residual chemicals from the processing of the tar sands that are mobile, will be transported with the migrating water through the pits and dumps.

IV. GROUND WATER DISCHARGE PERMIT-BY-RULE DEMONSTRATION

Q. WHAT IS THE DATE OF THE DEMONSTRATION SUBMITTED TO DWQ BY EER?

A. February 21, 2008.

Q. WHAT IS THE DATE OF THE NOI THAT WAS APPROVED ON SEPTEMBER 19, 2009?

A. May, 2009.

Q. WAS THE NOI REVISED BY EER BETWEEN THE SUBMITTAL OF THE DEMONSTRATION AND THE SUBMITTAL OF THE NOI THAT WAS APPROVED BY DOGM?

A. Yes. In response to four reviews by DOGM, EER revised the NOI four times between February 21, 2008 and May, 2009.

Q. CAN YOU DESCRIBE SOME OF THE DIFFERENCES BETWEEN THE PLAN OF OPERATIONS AS IT WAS SUBMITTED TO DWQ IN THE DEMONSTRATION AND THE PLAN OF OPERATIONS AS IT WAS APPROVED BY DOGM?

A. There are several significant differences, especially with regard to probable impacts. First, as I discussed above, the Demonstration (pgs. 5, 6) states that the tailings will be placed in the backfilled pits, whereas the NOI reports that tailings will also be placed in the dumps (pgs. 20, 21, Figure 2a). This is a significant difference because DWQ's Permit-by-Rule determination did not even consider the dumps (and the tailings incorporated in them) as a potential source of ground water contamination. Second, the Demonstration only mentions mining from a single 62-acre pit (pg. 4), whereas the NOI reports mining from two pits totaling 93 acres (pg. 22) (50 percent larger than what EER reported to DWQ). Third, the Demonstration reports two overburden/interburden disposal sites (approximately 25 acres each) (pg. 5); whereas the NOI reports that they will be 36 and 34 acres in size (pg. 22) (40 percent larger than what EER reported to DWQ).

Q. IN YOUR OPINION, SHOULD DOGM HAVE RELIED ON THE PERMIT-BY-RULE DETERMINATION OF DWQ?

A. No. DWQ determined that the mine should have a *de minimis* effect on ground water quality. However, because this determination was based on a plan of operations that underwent four significant revisions before DOGM approved it, and departed in significant ways from the plan of operations that was submitted to DWQ in the Demonstration, DOGM should have required a new determination from DWQ based on the plan of operations that DOGM approved. In addition, the DWQ letter of March 4, 2008 stated that "[i]f any of these factors change

because of changes in your operation or from additional knowledge of site conditions, this permit-by-rule determination may not apply and you should inform DWQ of the changes…."

V. POTENTIAL IMPACTS TO SURFACE AND GROUND WATER SYSTEMS

Q. WHAT DO THE UTAH RULES FOR LARGE MINING OPERATIONS REQUIRE WITH REGARD TO SURFACE AND GROUND WATER SYSTEMS?

A. *Rule R647-4-109 Impact Assessment* requires that:

> *The operator shall provide a general narrative description identifying potential surface and/or subsurface impacts. This description will include, at a minimum:*
>
> *1. Projected impacts to surface and groundwater systems; .....*
>
> *4. Projected impacts of the mining operations on slope stability erosion control, air quality, and public health and safety;*
>
> *5. Actions which are proposed to mitigate any of the above referenced impacts.*

Q. WHAT POTENTIAL IMPACTS COULD OCCUR TO SURFACE WATER QUANTITY AS A RESULT OF THE PROPOSED MINE?

A. The mining operation will disturb a total of 213 acres. Runoff from the site will be eliminated from the pits, plant area, roads, topsoil piles, and dump tops, which will be self-

contained (NOI, pg. 36; SWPPP, pgs 15-16). Thus, the total area that presently contributes runoff to the natural drainages will be reduced by about 187 acres (Knoop, pg. 4).

Q. HOW WILL THIS AFFECT THE SURFACE WATER QUANTITY?

A. There will be significantly less surface water flow in the intermittent and ephemeral drainages as a result of eliminating about 187 acres that currently contribute runoff.

Q. HOW LIKELY IS IT THAT THESE IMPACTS WILL OCCUR?

A. In my opinion, these impacts are almost certain to occur. I cannot imagine a scenario where runoff is eliminated from 187 acres and there is no impact on the downstream surface water system. In addition, EER acknowledges that having a large portion of the mine area internerally draining will "[c]reate an impact on surface water quantity by removing run-off from the Main Canyon drainage basin…" (Bayer, pg. 6). Furthermore, DOGM states that chances are there would be less runoff (Depo, pgs. 275-276).

Q. DOES THE NOI CONTAIN A GENERAL NARRATIVE DESCRIPTION OF THIS PROJECTED IMPACT TO SURFACE WATER QUANTITY?

A. No, the NOI does not contain a description of the potential impacts that will occur as a result of eliminating a significant area from contributing to runoff.

Q. IS THERE A POTENTIAL FOR IMPACTS TO SURFACE WATER QUALITY?

A. Yes. As discussed above, seepage of precipitation through the tailings in the pits and dumps will occur. This water will migrate down gradient as ground water and can reach the

surface at existing or new points of discharge (seeps or springs). Once at the surface, this contaminated water can flow off-site in existing drainages and will impact downstream surface water quality.

Q. IS IT YOUR OPINION THAT THERE IS A CONNECTION BETWEEN GROUND WATER AND SURFACE WATER?

A. Yes.

Q. DOES DOGM AGREE WITH THIS OPINION?

A. Yes. DOGM states that surface and ground water are related (Depo. pgs. 295-296).

Q. DOES THE NOI CONTAIN A GENERAL NARRATIVE DESCRIPTION OF THIS PROJECTED IMPACT TO SURFACE WATER QUALITY?

A. No, the NOI does not contain a description of the potential impacts that will occur as a result of contaminated water from the pits and dumps reaching the surface.

Q. IS THERE A POTENTIAL FOR IMPACTS TO GROUND WATER QUANTITY?

A. Yes. As discussed above, there are shallow isolated perched aquifers that discharge to nearby seeps and springs. EER clearly states that "[i]t is possible that the planned open pits will mine through and remove some isolated water bearing zones that provide recharge to seeps adjacent to the mine area…." (Bayer, pg. 11).

Q. DOES THE NOI CONTAIN A GENERAL NARRATIVE DESCRIPTION OF THIS PROJECTED IMPACT TO GROUND WATER QUANTITY?

A. No.

Q. IS THERE A POTENTIAL FOR IMPACTS TO GROUND WATER QUALITY?

A. Yes. As discussed above, seepage of precipitation through the tailings in the pits and dumps will occur. As this water percolates through the tailings, there will be increases in TDS and any chemicals remaining from the processing of the tar sand. This contaminated water will continue to migrate to existing ground water systems, or will establish new ground water systems.

Q. DOES THE NOI CONTAIN A GENERAL NARRATIVE DESCRIPTION OF THIS PROJECTED IMPACT TO GROUND WATER QUALITY?

A. No. EER assumes, without any data or analysis, that migration of water through the pit is not anticipated. As discussed above, this unsupported assumption is in direct conflict with the published literature, field evidence, and the opinions of DOGM. Furthermore, the Demonstration never considers the potential impact of migration of precipitation through the waste dumps. As discussed, this Demonstration does not reflect the plan of operations approved by DOGM, and EER failed to even notify DWQ that tailings will be placed in the waste dumps.

VI. RECLAMATION

Q. WHAT IS 40-8-12 OF THE UTAH MINED LAND RECLAMATION ACT?

A. That section discusses the objectives of mined land reclamation:

> *40-8-12. Objectives.*
>
> *The objectives of mined land reclamation are:*
>
> *(1) to return the land, concurrently with mining or within a reasonable amount of time thereafter, to a stable ecological condition compatible with past, present, and probable future local land uses;*
>
> *(2) to minimize or prevent present and future on-site or off-site environmental degradation caused by mining operations to the ecologic and hydrologic regimes and to meet other pertinent state and federal regulations regarding air and water quality standards and health and safety criteria; and*
>
> *(3) to minimize or prevent future hazards to public safety and welfare.*

Q. DOES THE NOI SAY THAT EER INTENDS TO COMPLY WITH THE UTAH MINED RECLAMATION ACT?

A. Yes, in two places, EER commits to complying with 40-8-12. First the NOI states "In order to ensure an environmentally safe and stable condition for the wildlife in the area that meets the objectives of the Utah Mined Land Reclamation Act 40-8-12, Earth Energy will leave safe, stable topography; establish native vegetation suitable for habitat; remove man-made structures, including tanks, ponds, etc.; **and cause no degradation or harm to water**

resources…." [emphasis added] (pg. 52). Second, the NOI states that the intent of the reclamation is to meet the requirements of the Utah Rules at R647-4 and to meet the objectives of 40-8-12 of the Utah Mined Land Reclamation Act (pgs. 52-53).

Q. DO YOU BELIEVE THAT THERE IS THE POTENTIAL FOR OFF-SITE DEGRADATION OF THE HYDROLOGIC REGIMES?

A. Yes. As discussed in detail above, I believe that there are potential impacts to both the water quality and quantity of surface and ground water systems. The NOI does not contain information that these potential impacts will be mitigated by reclamation. (In fact, for most of the potential impacts, the NOI does not even provide a narrative of the impact).

Q. DO YOU BELIEVE THAT THERE ARE POTENTIAL IMPACTS TO SURFACE AND GROUND WATER SYSTEMS THAT WILL INHIBIT THE POSTMINING LAND USE?

A. Yes. Changes in the amount of surface and ground water available for wildlife could inhibit the stated post mining land use. Ground water that discharges at seeps and spring could have degraded water quality and thus inhibit the use by wildlife. In addition, degradation of surface water quality could similarly inhibit the use by wildlife. Unfortunately, the NOI does not present even a discussion of these potential impacts to wildlife.

Q. DO YOU BELIEVE THAT THE INSPECTIONS OF THE MINE SITE THAT ARE DESCRIBED IN THE NOI ARE SUFFICIENT TO DETECT AND EVALUATE IMPACTS TO THE HYDROLGIC SYSTEMS?

A. No. The NOI states that the only "monitoring" that will be conducted during reclamation will be visual inspections focusing mostly on erosion and sediment control (pg. 53). These visual inspections are incapable of detecting degradation of surface water flows, ground water discharges, surface water quality, or ground water quality and thus, DOGM and the public will have no means of assessing whether EER has complied with 40-8-12 or the R647 Rules. The NOI contains no description of any monitoring, data collection, or analyses for any of the potential impacts discussed above.

Q. ASSUMING THAT DOGM DID IMPLEMENT A DATA COLLECTION AND ANALYSIS PROGRAM, WOULD THAT ENSURE THAT THE RECLAMATION OBJECTIVES IN R647-4 AND 40-8-12 ARE BEING MET?

A. No, because there are no baseline data on surface or ground water quantity or quality that can be used for comparison to ensure that degradation to the hydrologic regime is being minimized or prevented.

VII. EER'S FEBRUARY 8, 2011 LETTER TO DWQ

Q. ARE YOU FAMILIAR WITH THE LETTER THAT EER SUBMITTED TO DWQ ON FEBRUARY 8, 2011?

A. Yes.

Q. WHAT IS YOUR UNDERSTANDING OF THE PURPOSE OF EER'S LETTER?

A. EER acknowledges that they have changed the chemical processing of the tar sands, the method of dewatering the tailings, and the size of the waste dumps. In addition, EER informs DWQ for the first time that tailings will be placed in the waste dumps. EER also acknowledges that there are springs in the lease area. In spite of these changes and new information, EER requests that DWQ confirm that the Ground Water Discharge Permit-By-Rule status granted by DWQ on March 4, 2008 remains valid and in effect.

Q. WHAT IS THE BASIS OF EER'S REQUEST?

A. EER presumes that the DWQ determination on March 4, 2008 was based on only four factors and that none of the changes to the proposed operation affect those factors (EER, February 8, 2011). First, this presumption is incorrect because DWQ's determination was clearly based on EER's representation at the time that tailings would only be placed in the backfilled pits and not also be placed in the dumps. In addition, DWQ's determination should have been based on a full review of all the information submitted to them by EER at the time, including a review of all the analytical data.

Q. WAS DWQ'S MARCH 4, 2008 DETERMINATION BASED, IN PART, ON THE RESULTS OF ANALYTICAL TESTING OF THE LEACHATE FROM THE PROCESSED TAR SANDS?

A. Yes.

Q. IN THEIR FEBRUARY 8, 2011 LETTER, DOES EER PROVIDE DWQ WITH THE RESULTS OF ANALYTICAL TESTING THAT REFLECTS THE CHANGES IN THE CHEMICAL PROCESSING OF THE TAR SANDS?

A. No. They simply state that they have removed the stabilizer component from the cleaning emulsion used for the bitumen extraction. In addition, EER only states that **most** of the reagent (D-limonene) used in the extraction process will be recovered. They do not provide results of any testing to quantify the amount of the reagent that will be disposed of with the tailings.

Q. WAS DWQ'S MARCH 4, 2008 DETERMINATION BASED, IN PART, ON THE UNDERSTANDING THAT TAILINGS WOULD ONLY BE PLACED IN THE PIT?

A. Yes, this was expressly addressed in the DWQ March 4, 2008 letter: "[b]ased on these data, the tailings will be disposed by backfilling into the mine pit…."

Q. WHAT DID EER REPORT TO DWQ IN THEIR FEBRUARY 8, 2011 LETTER WITH REGARD TO THE DISPOSAL OF THE TAILINGS?

A. EER states that "[i]t is necessary to dispose of **some** processed sands and fines in the overburden/interburden storage areas…." [emphasis added].

Q. DO YOU BELIEVE THAT THIS STATEMENT ACCURATELY INFORMS THE DWQ OF THE INFORMATION THEY SHOULD CONSIDER IN A *DE MINIMIS* DETERMINATION?

A. No, I believe that this statement is misleading.

Q. WHAT IS THE VOLUME OF TAILINGS THAT EER PROPOSES TO DISPOSE OF IN THE WASTE DUMPS?

A. EER reports that the total volume of tailings that will be disposed of in the pits and dumps is approximately 5,127,000 cubic yards (NOI, pg.24). The NOI does not give a breakdown of the percentage that will be placed in the pits or in the dumps. However, the NOI reports that approximately half of the total amount of material that will be disposed of (tailings and overburden/interburden) will be put into the dumps (pg. 24). Based on this proportioning of the material, a first approximation of the amount of tailings placed in the dumps would be about half of all the tailings, or approximately 2,563,000 cubic yards. This is likely the upper limit of the volume of tailings in the dumps because the dumps may contain a higher percentage of overburden that is generated as the pit is initially developed. Assuming that 25 to 50 percent of all the tailings generated will be disposed in the dumps, the volume would be approximately 1,282,000 to 2,563,000 cubic yards.

Q. IN YOUR OPINION, IS DWQ'S MARCH 8, 2008 DETERMINATION VALID?

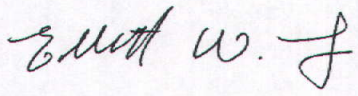
A. No. EER has made significant changes to the plan of operation that was considered by DWQ in 2008. These changes directly affect the basis of a *de minimis* determination and therefore the March 8, 2008 determination is not valid for the operation that EER now proposes. In addition, as discussed by Norris, the Demonstration upon which DWQ relied for the *de minimis* determination was flawed because of the improper analyses that were conducted to characterize the leachate from the tailings (pgs 21-27).

Q. IN YOUR OPINION, DOES THE LETTER SUBMITTED TO DWQ BY EER ON FEBRUARY 8, 2011 PROVIDE ENOUGH INFORMATION FOR DWQ TO MAKE A NEW *DE MINIMIS* DETERMINATION?

A. No, EER has failed to provide DWQ with the information necessary to evaluate the potential impacts on ground water quality. First, DWQ must consider the results of appropriate analytical tests of the leachate that will be generated from the chemical processing that EER now proposes. Second, DWQ must be informed of the actual quantity of the reagent (D-limonene) that will remain after the processing and that will be disposed of with the tailings in the pit and dumps. Third, DWQ must be informed of the actual volume of tailings that will be disposed of in the waste dumps and an analysis of the potential for impacts to ground water quality from leaching of these tailing and the residual processing chemicals.

Q. DOES THIS CONCLUDE YOUR TESTIMONY FOR NOW?

A. Yes.



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In The Matter Of:

vs.

Division of Oil, Gas & Mining
February 02, 2011

Tempest Reporting, Inc.
175 South Main, Suite 710
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analysis?
A. I don't know that she did.
Q. Okay.
A. I would be speculating, but I don't know that she did.
MR. ALDER: If you need to ask that question we will provide her this afternoon.
MS. WALKER: Okay. Hang on just a second, I think I've got everything.
Q. So Rob asked you about the reclamation rule, so the portion of your rules that deals with reclamation?
A. Uh-huh.
Q. Again, how do you know that the operator has met those obligations?
A. In the plan or on the ground?
Q. At this stage. So I guess we're talking about in the plan?
A. We look at what the rule requires, we look at the plan, make that comparison. And as I was trying to explain, that we use our professional judgement in deciding if the plan is adequate to meet those rules and the standards that are in the rules.
Q. So does that mean your review is

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subjective?
A. To some degree it is, yes.
Q. So what objective elements are there?
A. What objective elements? I'd have to look through the rules to see exactly -- actually I think probably most of it is subjective. I believe it is. I'm trying to think of anything where it's really specific where, say, numbers are required, very specific things that are objective.
There are -- one thing that comes to mind is the high wall. High wall is not allowed to be steeper than one to one. That's certainly objective. The plans require to contain certain descriptions and we would look to be sure that all of those are in place. But as far as how they apply to the plan, nearly everything there is subjective.
MS. WALKER: Okay.
MR. DUBUC: Take a break?
MS. WALKER: I don't know break, but so I think we're done.
MR. DUBUC: Thank you.
MS. WALKER: Thank you.
MR. DUBUC: Appreciate your patience.
MR. ALDER: Can I ask one follow-up question just in that last area?

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EXAMINATION
BY MR. ALDER:
Q. Is there a distinction in your mind between the answer that you gave when you said it's a matter of professional judgement and the use of the term "subjective" --
A. No.
Q. -- as you used it?
A. I think those are -- those are essentially identical.
MR. ALDER: Okay. That's all I have. Thanks. Want to take -- or just switch? Take a break while we switch places?
(There was a break taken.)

PAUL BAKER,
called as a witness, having been duly sworn, was examined and testified previously.

LESLIE HELPER,
called as a witness, having been duly sworn, was examined and testified as follows:

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EXAMINATION
BY MR. DUBUC:
Q. Leslie, you've never been deposed before?
A. That's correct.
Q. But Paul was sort of first out of the shoot, so you have an idea of how it's going to go?
A. That's correct.
Q. Just ask for any clarification if you need it, okay.
So would you state your name and your position.
A. Leslie Helper, Reclamation Specialist For the Department of Oil, Gas & Mining.
Q. Reclamation Specialist. What does that mean? What are your duties?
A. My duty is to review incoming permits, make sure that they have enough money in their bond, that they can do the reclamation and the program that they have outlined in their NOI.
Q. So is that the extent of your duties is reclamation?
A. I review the NOI and make sure there's enough bond for the reclamation that they are proposed. I'll oversee reclamation on the field during the course while they're reclaiming also.

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A. The entire from where you started to the end?
Q. Uh-huh.
A. Okay.
"The Parachute Member of the Green River Formation is the surface bedrock formation found throughout much of Earth Energy's lease, and the underlying Douglas Creek member of that formation contains the tar sands deposit that would be mined during this project. Five distinct asphalt impregnated sands, labeled 'A', 'B', 'C', 'D' and 'E' with 'E' the highest strata, occur in the upper portion of the Douglas Creek Member."
This is by Byrd, William 1970 and Clem K 1984.
"The 'E' bed is regionally known, but is not present locally. The remaining beds crop out in PR Canyon to the northeast and Main Canyon to the southwest of Earth Energy's proposed operations. All four beds occur in an interval 240 to 290 feet

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thick (Murphy, Leonard, 2003 private report). Earth Energy's primary target at this time are the 'C' and 'D' beds. The Douglas Creek Member forms the uppermost recognized aquifer in the project area."
Q. Okay, thank you.
Now, when we talk about the Douglas bed, are you familiar with this map?
A. Yes, I am.
Q. What is the -- what's the primary aquifer designated on that one?
MR. ALDER: Would you identify the map for the record.
MR. DUBUC: I'm sorry. It's Figure 5 of the NOI. Yes, we will want both of those as exhibits, I'm sorry.
(Exhibits 5 and 6 were marked for identification.)
THE WITNESS: The Douglas Creek.
Q. BY MR. DUBUC: Are you familiar with the characteristics, the property -- aquifer properties of the Douglas Creek? Is it an aquifer?
A. The BLM --
MR. ALDER: Are you familiar with the Douglas -- there's two questions there. Answer one.

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MR. DUBUC: I apologize.
THE WITNESS: Have I personally drilled a well in the Douglas Creek? No, I have not.
MR. ALDER: That was not the question. Just answer the question as he asked it.
THE WITNESS: Please repeat.
Q. BY MR. DUBUC: Based on the information in front of you, can you identify the primary aquifer and the characteristics of the primary aquifer in that area?
A. It's Douglas Creek.
Q. Okay. All right. Are there additional aquifers in that area that you're familiar with?
A. In geology you think in 3D, and eventually at some depth you will run into other aquifers.
Q. Okay. In this area?
A. If there's a surface expression, the answer is the Douglas Creek is the only aquifer shown on this map. The Wasatch actually is shown on here.
Q. Okay. Are there other seeps and springs in that area?
A. There is seeps and springs in the area.
Q. Okay. Where would they be depicted?
Let me present you with Figure 7. Are

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you familiar with that figure? It's Figure 7 of the NOI, and we will want that as an exhibit as well.
A. Yes, I am familiar with this figure.
Q. Is that evidence of additional seeps and springs in the area?
A. Yes, that's correct.
Q. Okay. What is the depth of the primary aquifer that you're stating is underlying this entire area? Are you familiar with that?
A. In this local area the Douglas Creek is only utilized as an aquifer by a local rancher.
Q. Can you -- let me -- I'm going to hand you Page 30 of the NOI, and I'd like you to read -- and I want that as an exhibit -- read in between the highlighted sections, please.
A. "The depth to the regional groundwater table in the vicinity of the Study Area is expected to be 1,500 feet or more (Price and Miller 1975). Nearby springs or seeps (shown on Figure 7) provide evidence of very localized, shallow groundwater, likely representing isolated perched aquifers."
Q. Do you agree with that?

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A. Absolutely.
Q. Okay. So the aquifer that is at 1,500 feet, is that the primary aquifer that you -- the Douglas Creek member of the Green River Formation, is that the aquifer that is a 1,500 feet?
A. I can't answer that question based on what I have in front of me.
Q. Okay. Would you agree that there are -- you did agree that there were local seeps and springs --
A. Yes.
Q. -- within the confines of this project?
A. That is correct.
Q. Is it possible, in your professional opinion, that an aquifer 1,500 foot below ground level would have evidence of seeps and springs within the confines of this project or --
A. I do not believe that's where the seeps and springs are coming from.
Q. Then where are the seeps and springs coming from?
A. They're local -- local lenticular sandy units within the Green River Formation.
Q. Okay. Do you know what the height of those would be?

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A. No. This was deposited in a lacustrine delte- -- depositional environment, and they're non-continuous units.
Q. Have you been out to that site?
A. Yes, I have.
Q. Have you seen evidence of these seeps and springs?
A. No, I have not.
Q. Is it your opinion that -- you did state it was your opinion they exist?
A. Yes. In geologic time they will exist. Are they existing units.
Q. Okay. When did you go out there? What time of year?
A. It was late in -- it was December. Probably December 2008.
Q. So you've been out there once?
A. Yes, that's correct.
Q. Is it possible that those seeps and springs are flowing -- first of all that you -- did you walk the entire area?
A. No, I did not.
Q. Okay. So it's possible that there were seeps and springs that you did not see?
A. That is correct.

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Q. Is it also possible there are seeps and springs that might flow at different times of the year?
A. That is correct.
Q. That would be based on recharge of these aquifers?
A. Just the possibility that a seep and a spring, depending on the climatic conditions at that time, could be viable. That does not mean that today they're a viable seep or spring.
Q. Okay. What would cause them to flow?
A. The change in the climatic conditions.
Q. Such as?
A. Such as if you entered a very wet period in geologic time.
Q. Okay. Do these seeps and springs exist today?
A. If you're asking today in geologic time, people have looked for evidence of these on the field, they've gone to them, and they have not seen them.
Q. The NOI states they exist, correct? And if they do exist, which you acknowledge they do, then they would be tied to regional aquifers that would be recharged by precipitation; is that correct?
A. No, that's not correct.

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Q. Okay. Then how -- then how were they recharged?
A. They would be recharged by precipitation from above.
Q. Right. That's what I said, I thought.
A. Yeah.
Q. So there's sufficient precipitation in that area to recharge these local aquifers that would then evidence themselves in the surface of seeps and springs. Would you say that's a fair statement?
A. The particular one that the division is worried about, there was no evidence whatsoever either on vegetation or development of geology, you know, such as washing away, at the one that we were interested in.
Q. Okay. Tell me what you mean by "the one you were interested in"?
A. The one that would be covered by our rules.
Q. Is there only one of those covered by your rules?
A. That is correct.
Q. Okay. Can you give me the basis of that statement?
A. We're concerned with ones within 500 feet

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of the mine.
Q. Okay. Where does that figure come from?
A. Other expertise within the division.
Q. Is that written anywhere?
A. I have not noticed it looking at the geology sections of the rule.
Q. Okay. So let me back up.
What you're saying is that you have internal guidance --
A. Yes, that's correct.
Q. -- that outlines what the parameters are that you should be looking for in the context of, say, seeps and springs?
A. That is correct.
Q. And that's -- you have it in writing and you use that guidance to evaluate?
A. No. That was not internal, that was verbal. That was not in written text, that was in verbal. Verbal communication.
Q. From whom?
A. Tom Monson.
Q. Okay. I'll defer that question to Tom. Okay.
So Mr. Monson gave you -- provided you with guidance that you used in your oversight of the

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reclamation aspect of this. In other words, you're only concerned with seeps and springs within 500 feet of the outline of the mine; is that what you said?
A. That is correct. Doesn't mean that geology is not homogeneous. To understand the geology you have to look at the total picture.
Q. What does that mean?
A. The stratigraphy is not continuous in a setting, so to understand whether it was continuous, you look at a larger area.
Q. Greater than 500 feet?
A. That's correct.
Q. Did you do that in this case?
A. Did I go out and field check them? No.
Q. No. So what you're saying is that it's possible that these aquifers -- and you do admit that it -- if there are seeps and springs, which you say there are, then they would be recharged by aquifers shallower than 1,500 feet down; is that fair?
A. No, I -- I don't believe they're recharged from an aquifer. I believe they're lenticular. That means they're not continuous between one --
Q. Sure.
A. -- unit to the other.

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Q. But they're not charged by the regional aquifer, they're charged by precipitation?
A. That is correct.
Q. Okay. And they are shallower than 1,500 feet, is that...
A. Yes, that is correct.
Q. Okay. And they're evidenced by the seeps and springs that --
A. That's correct.
Q. Okay. So when you say it's not -- and I'm not -- I'm not trying to paraphrase, because I'm not a geologist so I don't understand some of this stuff -- is it possible that something -- this lenticular aquifer or layer --
A. Yes. And it's not a layer. It's non-continuous.
Q. What do you mean by that?
A. That pen is not touching my piece of paper.
Q. Sure. What does that mean? I'm sorry, that's a little --
A. Well, how you going to -- if you have -- if you have a different unit here that's impermeable, the water cannot go between that and that.
Q. Sure, I understand that. But then what

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feeds that pen?
A. The precipitation that's coming from the surface.
Q. But it doesn't go directly, right? It goes into a layer of some sort and then working it's way out into the seep and spring. Is that how that -- okay. You explain to me how precipitation gets to the pen.
MR. ALDER: Or the seeps and springs.
MR. DUBUC: I'm just trying to roll with this.
THE WITNESS: In some particular cases it would come in through fractures. There's not a lot of evidence for fracture or jointing out in the systems out there. The structures regime that's out there has not seen a lot of folding or faulting, or what is called brittle deformation, to give you that.
So if there was a high land area where it would seep in, then it would seep out when it hits -- when it daylights, when that particular lenticular piece daylights.
Q. BY MR. DUBUC: Is that present in this situation, in your estimation?
A. Not really, no.
Q. Then what is the origin of the seeps and

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a water right being filed on it, and field review by others showed that there was no --
MR. DUBUC: Sorry, it just was a little crazy.
THE WITNESS: Field review by others showed that there was no sign of a seep at that location.
Q. BY MR. DUBUC: Okay. In order to identify the water features on this map, was a systematic study done in order to do that? How were those identified?
A. That was identified by the client of the operator, by the consultant of the operator.
Q. Do you know if a systematic methodology was used to do that?
A. No, I do not know that for sure.
Q. Do you know if this was done multiple times of the year in order to determine when those seeps and springs may or may not flow?
A. No, I do not.
Q. Okay. Do you know, has the division verified when those seeps and springs flowed? You said you went out there in December and that's the only visit to the site; is that correct?
A. That is correct. That area was under

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snow.
Q. So the division has not conducted a systematic --
A. That is correct.
Q. -- survey. Okay. All right.
Okay. This is Page 2 of the groundwater demonstration, starting with where the line "BLM" is, could you read that, please. Just -- no, right here (indicating.)
A. The one line BLM?
Q. Well, into the -- and I'll tell you about when to stop.
A. Okay.
"BLM wrote the following about the geology and hydrogeology in the general vicinity of the project area.
"The Douglas Creek Aquifer receives recharged mainly by infiltration of precipitation and surface water in its outcrop area, with little leakage from underlying bedrock aquifers. It discharges locally to springs in the outcrop area and to [alluvial] alluvium along major drainageways such as the Green and White Rivers.

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In the study area, flow is generally to the north and northwest. The unit is roughly 500 feet thick" --
Q. Okay, that's -- that's fine. So that -- put a tag on that.
(Exhibit 10 was marked for identification.)
Q. BY MR. DUBUC: That relates back to what we were talking about earlier in terms of a geological makeup of that area, right? Where it would be precipitation in the form of rain or snow?
A. Uh-huh.
Q. That would seep down into these layers and that would manifest themselves in these seeps and springs. Is that basically what that says?
A. Yes, it does.
Q. Okay.
A. In the general vicinity of the project area, not at the specific location.
Q. Do you have any information that points to or that refutes that that applies to this particular area?
MR. HOGLE: Objection, vague.
THE WITNESS: No, I do not.
Q. BY MR. DUBUC: So it is possible that this characterization of BLM, which is in the NOI

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groundwater demonstration, does in fact apply to the area that's being affected?
A. Possible, but not probable.
Q. What do you base it on?
A. The fact that this is at the top of the watershed.
Q. Okay. What specifically do you base that on?
A. The topographic contour lines on the map.
Q. Okay. What testing have you done to determine the layers that exist beneath the surface that would confirm or deny what you're saying?
A. That question isn't relative -- relevant to the size of the basin being at the top.
Q. I'm not --
A. What's underneath does not have anything to do with the topography of the area.
Q. Could you explain that.
A. Topography is geomorph. Stratigraphy is geology.
Q. Okay. What has that got to do with rainwater seeping into lenticular layers and seeping out into -- manifesting itself in seeps and springs? What I'm asking is, is what testing has -- if you refute that what the BLM says applies to this area,

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I'm asking, first of all, what you're basing that on, and secondly, what testing have you done to confirm or deny that assessment?
A. I do not know exactly what area he is talking about. That is not a complete article.
Q. But that is within the NOI that was submitted, so we assume that it is applicable to this project; is that correct?
MR. ALDER: Objection, that's very compound.
MR. DUBUC: Okay.
Q. So was this submitted in relationship to this project, this demonstration?
A. Yes, it is.
Q. Is it your assessment that this person who signed it, Bob, whatever his name is, you said you trusted his judgement?
A. Yes, I did.
Q. Would you then say that what he put in here must be applicable to the situation or that it wouldn't be in the report?
A. As written it applies to the vicinity. He put it in -- he indented it because it's taken out of context.
Q. It's a quote?

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A. But there's other part -- if this refers to a map, I don't know if the next sentence talks about a map. I don't know that.
Q. You stated earlier that you accept this report because it was signed by an individual that you trusted?
A. It was signed by a registered professional geologist in the state of Utah.
Q. So my point is, is that you're accepting what is in this report as correct?
A. That is correct.
Q. Okay. Do you have any reason to refute that this statement that you read applies to this particular situation?
MR. ALDER: It's been asked and answered.
MR. HOGLE: And it's vague.
MR. DUBUC: I'm not sure it's been answered.
MR. ALDER: Go ahead.
THE WITNESS: When the word "vicinity" is used that is a vague statement.
Q. BY MR. DUBUC: Then what testing has the division done to confirm or deny the application of that to this?
A. His many other statements throughout this

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document that deal with the same issue.
Q. Okay. Can you point those out?
A. You want to -- the next paragraph down.
Q. Paragraph down from what, please?
A. Same exhibit from what you just had me read.
Q. Okay.
A. After comma:
"...PR Springs, are reported to discharge from the Parachute Creek Member of the Green River Formation (Price and Miller), and represent isolated, perched aquifers."
Q. Okay. Now those isolated perched aquifers and -- that you're referring to -- do they exist within the confines of this affected area?
A. I do not know.
Q. Okay. Let me read -- read the second sentence in that paragraph starting with "However."
A. "However there are several nearby springs and/or seeps that provide evidence of localized, shallow ground water."
Q. Do you agree with that statement?
A. Yes, I do.

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Q. Okay. Do you disagree with the BLM statement up above?
A. I don't disagree with the statement.
Q. Okay.
A. But vicinity does not say it is at this exact location.
Q. Okay. However, that sentence you just read does point to --
A. Applies more to the area --
Q. And it does --
A. -- than up above.
Q. -- does state several nearby seeps and springs that provide evidence of localized shallow groundwater. Okay. I just want to make sure we're on the same page.
A. Yeah.
Q. Okay. Now, this -- there are several places in the NOI that refer to Price and Miller. Are you familiar with that reference?
A. No, I am not.
Q. Okay. So earlier you read on Page 30 of the NOI, this statement. Read the first sentence.
MR. ALDER: Can she read the whole thing, make sure it's in context?
MR. DUBUC: Sure.

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THE WITNESS: "The depth to the regional groundwater table in the vicinity of the Study Area is expected to be 1,500 feet or more (Price and Miller). Nearby springs or seeps (shown on Figure 7) provide evidence of very localized, shallow groundwater, likely representing isolated perched aquifers."

Q. BY MR. DUBUC: So this is what we are talking about, and this is the "however" in that sentence, that there -- even though there is a regional groundwater aquifer, there are several localized aquifers that feed these seeps and springs. Do you agree with that statement?

A. Yes.

Q. Okay. This is from the Price and Miller report, and it is Page 27. We'll put a exhibit on that.

(Exhibit 11 was marked for identification.)

MR. DUBUC: Can you just read the highlight.

THE WITNESS: This is related to groundwater recharge.

"The principal source of ground-water

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recharge is precipitation that falls on the high southern rim of the Uinta Basin" -- isn't a complete sentence -- "Water from rain and melting snow percolates directly, or from streams, into the underlying sedimentary rocks."

Q. Okay. So would you agree that based on the Price and Miller report that the primary recharge of the localized aquifers, the perched aquifers, is rainwater?

MR. ALDER: I object to your raising of what she just read, and I would object to her summarizing what the Price and Miller report says based on this one page. And I would request that we first establish if she has any -- I think she said she isn't familiar with that report, so, I mean, it's more of an exercise in logic than knowledge at this point.

Q. BY MR. DUBUC: Tell me where the recharge from the local aquifers comes from.

A. Precipitation.

Q. Okay. Is there sufficient precipitation in that area to recharge the local aquifers?

A. In my professional opinion, no.

Q. How many inches a year does that area

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get?

A. I do not know.

Q. Then how do you base a professional opinion on lack of knowledge?

A. I don't know the exact number.

Q. Would you be surprised if I told you it was 12 inches?

A. No. This is a desert.

Q. Is 12 inches sufficient, especially at certain times of year, to recharge local perched aquifers?

A. It depends on the stratigraphy and the transmissivity rate of individual units.

Q. Have you studied this area sufficient to be able to make an informed opinion on that?

A. I've studied the Green River Formation elsewhere.

Q. In this particular area have you studied it to make it?

A. No, I have not.

Q. Okay. Is it possible that conditions exist such that 12 inches a year would recharge aquifers enough such that these seeps and springs would flow?

A. You need to clarify the question.

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Q. Okay. What part of that don't you understand?

A. The depth to the aquifer that you're referring.

Q. Do you know the depth of the aquifers in that area?

A. No. I'm asking you to clarify.

Q. Okay. What are -- what is the depth of the aquifers in that area?

A. The one at 1,500 feet, it will not recharge that aquifer.

Q. No. What is the depth of the shallow aquifers referred to in the two documents you just read?

MR. ALDER: Are you referring to Exhibit 7? Do you want her to --

Q. BY MR. DUBUC: There are two --

MR. ALDER: -- because I don't recall any depth being mentioned.

Q. BY MR. DUBUC: So Exhibit 8 says that: "Nearby springs or seeps (shown on Figure 7) provide evidence of very localized, shallow groundwater, likely representing isolated perched aquifers."

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My question is: Is what is the depth of those isolated perched aquifers that is evidenced on Figure 7 by the seeps and springs?

A. Can't read the contour interval, but based on -- oh, contour interval 40 feet. So you're looking at 80 to 100 feet below.

Q. So 80 to 100 feet below the surface conditions exist such that precipitation filters down to that, some lenticular formation, and then flows out from there to these local seeps and springs?

If that's not a correct characterization please put it in your own words.

A. That is not correct, because we don't know the stratigraphy and the transmissivity rate -- typical transmissivity rate of a shale is ten to the minus seven centimeters per second. If you have one inch of shale in there you might have problems with your model.

Q. Okay. Then please explain to me how it works, if you can. I mean, if my characterization is inaccurate, and it's a very broad characterization; it rains, hits the ground, filters through the ground, hits this perched aquifer, flows out to the seeps and springs in some way, which is what -- how I read that statement.

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If that's not correct then please tell me how these seeps and springs, how the precipitation gets from Point A, the atmosphere, to Point C, the seeps and springs, through that Point B, the aquifer. How does that happen?

MR. ALDER: You're assuming that hypothetically it does, is what you're saying?

MR. DUBUC: I'm saying that that statement, which is in the NOI, says that it does.

MR. ALDER: Okay. I think she just answered your question, but please try and answer it.

MR. DUBUC: Does that not say that?

MR. ALDER: I don't think the witness thinks it says that, and I really feel like we've been over this subject so much that I'm wondering if we'll ever get to the rest of the subject. But please go ahead and let's try one more time to answer it.

MR. DUBUC: Okay, that's fine.

THE WITNESS: If any of this was continuous between the beds, you would see a line that followed the stratigraphy around if it was a continuous aquifer. It is not a continuous aquifer. It is a lens.

Q. BY MR. DUBUC: Okay. So there are multiple aquifers; is that what you're saying?

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A. Yes, most probably so.

Q. Those aquifers are recharged by precipitation?

A. That is correct.

Q. Okay. So does the NOI contain information on the location of those aquifers? Did I understand you to say no to that?

A. No, it does not.

Q. Okay. How about the number of these aquifers, does the NOI point to that?

A. No, it does not.

Q. How about the thickness of them?

A. No, it does not.

Q. Direction of movement and water with any of them, does the NOI contain that?

A. The NOI on the geologic map had the stratigraphy one and a half degrees to the northwest. But without actually doing testing you cannot assume that that's the direction of movement.

Q. So you're saying water could flow in the opposite direction, is that what you're saying? Is that what that means?

A. It could. Or lateral, or any vector some of there.

Q. Okay. Does the NOI contain maps or

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cross-sections showing where these aquifers are in the area of the proposed mine? And maybe that's a repeat of another question, but just for clarification.

A. No, it does not.

Q. Does the NOI contain information on the specific points of discharge? In other words, is there a connection between where these aquifers are and the figures, the points on Figure 7, is there any?

A. No, there's no continuity, no pattern to these seeps and springs.

Q. But you did say they were located 80 to 100 foot below the surface, approximately?

A. The closest one.

Q. Okay. Okay. So let's go back to these holes that were drilled earlier. I think we -- sorry. Let me back up one, I apologize.

Does the NOI contain a discussion narrative of any sort of potential impacts of the shallow perched aquifers?

MR. HOGLE: Impacts of -- I don't understand the question, vague.

Q. BY MR. DUBUC: Impacts as in the context of Section 109, talks about impacts?

A. The Permit-By-Rule Demonstration addresses that.

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come in while you're doing that.
Q. So eventually they're going to fill this mine up to the top?
A. Yes, that's right.
Q. The sides of this, are they just natural? How do they -- so what's to keep everything from caving in on the sides?
A. The slope stability of the area.
Q. So you just sort of dig, it's just a native earth, there's no barrier or anything, right?
A. It's been compacted by mother nature for thousands of years.
Q. Okay. So that's a yes. It's just native --
A. Yes, that is correct.
Q. Do we know what those layers are? Do we know?
A. It's the Green River Formation.
Q. But do we know what those -- do we have a chart of some sort that shows, you know, well for instance here's this layer, here's that layer. Is that outlined anywhere?
A. No, it is not.
Q. When they did this drilling was that to determine what those layers were? What was the

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purpose of these 25 holes they drilled? What was the purpose?
A. To define your ore body.
Q. Okay. Is there any other use? Would they also define the type of soils at the different layers? Did they do that as well, or not?
A. Usually they do.
Q. Okay. Is there any evidence? Do you know what those results of that are? Is that proprietary, or how does that work?
A. That is considered proprietary.
Q. Is it possible in drilling those holes that they may have said, all right, look, here's a sand layer, for instance, and here's this clay layer. Is that how that would work?
A. Yes.
Q. Okay. All right. So do you know for certain -- so you don't know what the composition of that side wall is and what those layers are; is that what you're saying?
A. It's going to be inner layered sandstone, siltstones, claystones, what makes up the Green River formation.
Q. Okay. Some of those could be some of these lenticular --

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A. Some of them will be very strong units that will act like a geotextile and greatly add to the slope stability.
Q. Some of these could be these lenticular aquifers we were talking about?
A. Yes, that's correct, which could be mined at a near vertical angle.
Q. Okay. Would you agree -- so tell me what's going to happen with the precipitation as it falls on the pit area.
A. They will maintain a lower area that will be a sump, and the water will go down to the sump area.
Q. Okay. What about the area already backfilled as that -- as a sort of --
A. It will percolate down through that material.
Q. Okay. To -- until when?
A. Until it hits the first impermeable layer, probably be the bottom of the pit.
Q. Do we know that that's the first impermeable layer?
A. No. They could be creating impermeable layers by backfilling with some of this overburden and interburden.

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Q. Is it also possible that it could percolate down to the bottom of the pit and continue percolating down?
A. Until it hit the, you know, one inch of shale.
Q. We don't know where that is; is that correct?
A. That is correct.
Q. And it could be hundreds of feet, perhaps?
A. Could be one inch.
Q. Could be hundreds of feet?
A. Could be hundred feet.
Q. Hundreds?
A. Could be hundreds.
Q. Okay. Now we talked about this so I just -- I don't want to hammer this too hard. Because of the -- this makeup of the leftover sand is not homogenous, right? I mean, it could be -- they talked about could be packets here and there could be a lot of fine in an area, could be a little fine in an area. Is that -- that's what we talked about earlier, would you agree? It's not homogenous. It's not like 15 percent of every --
A. It's not a -- they don't blend waste to

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put out on an ore -- out on a dump.
Q. So basically that material placed in the pits, what you said, the water will percolate down. So there will be some pour spaces because of the mixture, is that --
A. That's correct.
Q. Okay. Would you say that is -- that pour space or porosity is -- how would you compare that to the existing material?
A. It will be much more -- there's actually a swell factor once you mine material, so it will be much more porous than the in-place material.
Q. Okay. And so the water will sort of percolate through the tailings and will carry with it whatever it carries with it, right? Some sand?
A. Now we talking tailings? You were talking the in-pit fill.
Q. Okay. How would you characterize the in-pit fill? Is that the same material? Is that -- that's the end product of the process?
A. And the overburden and interburden.
Q. Okay. Then explain to me how that works. So as I understood it earlier -- hang on -- as I understood it earlier, what you said is you took the overburden and you put it into these tailing piles,

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these 70 acres. And then you started to, you know, continue to work down within the pit, and then you took the -- you didn't need those piles anymore so now you're able to take the processed material and put it back in the pit.
Is that done in a layered fashion? Do you put a little bit of processed material and a little bit of overfill? How does that work?
MR. ALDER: Objection --
MR. DUBUC: Okay.
MR. ALDER: -- to your description. Let's clarify that she understands and agrees with your description that you just made --
MR. DUBUC: Okay. I'm just trying --
MR. ALDER: -- because that's the predicate for your question.
MR. DUBUC: I'm trying to restate what I think she said.
MR. ALDER: And let's start there. Did he restate what you said earlier?
THE WITNESS: You're going to have to go through your question again, I'm sorry.
Q. BY MR. DUBUC: Initially we've got to get down to a certain layer in the pit?
A. That's correct.

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Q. So what we do in the meantime is we take the material plus whatever processed material digging out and put it over in the 70 acres?
A. That is correct.
Q. Until we reach a certain level of the pit?
A. That's correct.
Q. And then as we're in this pit, we're moving along and at some point we reach -- at some level within the pit we reach the bottom and we put -- we start to backfill?
A. That's correct.
Q. Okay. When we start to backfill, what do we backfill with?
A. Both interburden, overburden, and the process sands.
Q. In what composition? Is it layers? Is it all mixed together? How does that work?
A. It will be as it's handled. The mine will do everything they can to not do a rehandle on the material.
Q. So does that mean they'll put a bunch of -- and I'm going to use the word "tailings," and I'm sorry, you understand tailings are the --
A. Why don't you just call them fine sands.

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Why don't you call them the sands.
Q. Okay. The fine sand.
A. Processed sands.
Q. The processed sands.
So they're going to probably want to take a bunch of processed sands and put it in an area, and then what do they do? Do they then as they're digging out another area and they run into a layer of overburden, they have to put that somewhere so they just -- they'll put it on top of -- how does that work? So -- please characterize it?
A. There's a very small area for the processed sands to be stored in the process facility. So they will not let a mountain of them accumulate there. They will slowly, as they fill up that area, slowly be taking it over there. At the same time they will be taking their material, their overburden to expose more ore --
Q. Right.
A. -- and put it over there. So it will get blended. But it will not be anything that could be characterized as homogeneous where you could get a material property on it.
Q. And it's just sort of -- I mean, they're just going to make that assessment as they go; is that

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Q. Okay. I'm looking at this characterization, I assume there's some basis for it, and it's going -- it's higher to my left and it's lower to my right.
A. No. That's the high point. Part of it's going down here (indicating.)
Q. What is this black line here (indicating)?
A. That's the --
Q. Existing ground?
A. -- ground surface.
Q. So forget everything on top of the ground surface. If water hits this point, which direction's it going? None of this other stuff exists, just the ground. Is it going to go downhill?
A. I can't answer that question.
Q. Is it likely to go downhill?
A. I can't answer that question.
Q. Is it going to go uphill?
A. I see no possible way to get water in there that it wouldn't hit the ground surface.
MR. ALDER: For sake of the question assume that it did.
Q. BY MR. DUBUC: None of this stuff exists, it's just this ground. What I'm trying to get at is

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if a drop of water hits here, let's say a lot of drops of water, let's say it's a downpour, as those things happen out there.
A. Okay.
Q. Two things are going to happen. Two things are going to happen. One, some of it's likely to penetrate the ground. Two, the balance of it probably is going to run along that surface downhill; is that fair?
MR. HOGLE: Objection, compound.
MR. ALDER: I think we're going to concede that water flows downhill. We're going to give up on that point and say --
MR. DUBUC: Okay.
THE WITNESS: But this is downhill for the majority of the water. That's a very important point.
MR. ALDER: He is not talking about the surface. He's talking about assuming it gets past the surface, goes into the subsurface and hits the previously unexcavated portion of the mine. That's your question.
MR. DUBUC: Yes.
MR. ALDER: Will it flow downhill.
THE WITNESS: Water will flow downhill,

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but that's not how dumps work.
MR. DUBUC: Okay. Thank you.
MR. ALDER: That's not how dumps work you say?
THE WITNESS: That is correct.
MR. ALDER: Because it will be protected on the surface, is what you're saying?
THE WITNESS: Yes, that's correct. If that's how dumps work, every dump would have a river coming out at the base of it. That is not correct.
MR. ALDER: We're trying to answer his question and assume that it does get underneath.
MR. DUBUC: So for the record this is Figure 2A in the NOI, so we have a point of reference. Want to take a break or keep going?
THE WITNESS: Let's keep going.
MR. ALDER: Well, how close are you to finishing with Leslie, because I'm happy to -- I don't know about -- the court reporter would like a break I think.
MR. DUBUC: Would you like a break?
THE REPORTER: Yes.
MR. DUBUC: Let's just take five or ten.
(There was a break taken.)
Q. BY MR. DUBUC: Two things I want to just

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sort of fill in the gaps on. When rainwater -- yeah, so to speak -- when rainwater percolates down through the pit, the backfill pit we talked about earlier, and it hits the bottom, what's going to happen? Is it going to fill up? Is it going to filter out? Some combination of the two? Can you talk about that?
A. Probably get a little bit of each. You'll get, based on the size of the pit, for it to run over the top would be very improbable. A minor amount would filter in.
Q. Would filter into what?
A. The bottom of the pit.
Q. Okay. So --
A. As it filters in it would be clogging those pour spaces.
Q. Because why? Why do you say that?
A. Engineering judgement.
Q. You need to expand on that, Leslie, just a little bit. When you say "clogging the pour spaces," with what?
A. With the fine grain material.
Q. You mean the fine grain will migrate along the sand, along the water?
A. That's correct.
Q. Okay. I mean, how would you confirm or

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that what that says?
A. I don't --
Q. Under the TDS analysis in Table 3, that sentence?
A. Yeah, okay. Where do you see non -- oh, non -- from non-standard analytical.
Q. Go ahead and read the sentence.
MR. ALDER: Yeah, I object to your characterization of the language.
MR. DUBUC: I'm happy to -- go ahead and read the sentence.
THE WITNESS: What, the TDS in Table 3 is reported in milligrams for kilograms resulted from a non-standard analytical method --
MR. DUBUC: Poor lady.
THE WITNESS: Therefore -- sorry, I forget you're here.
"The TDS analysis in Table 3 are reported in milligrams/kilograms and result from a non-standard analytical method; therefore these results are not considered relevant for estimation of TDS of leachate from the process residuals."
Q. BY MR. DUBUC: Okay. So my question to

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you is: How important is TDS in terms of the impacts to groundwater? Surface water, excuse me, in this area?
A. I don't believe that it's a major factor.
Q. What do you base that on?
A. I base that on the quantities of runoff that are expected.
Q. Okay. Could you describe how that would work?
A. Well, I think -- and this is on surface water. Impacts to surface water, correct? That everything internal, obviously, drains into the pit or to the process pond.
So you've eliminated any surface water from leaving the site in the majority of the area. So, therefore, you're dealing with the waste dumps. And I -- the waste dumps, the actual contributing watershed area from the waste dumps is relatively small.
And the ability of that water to capture and dissolve TDS components, calcium, magnesium, things of that nature, are limited. And -- and then on top of that -- which would be carried, potentially in sediment.
So in order to have TDS you have to have

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water in contact with those components. You have to be able to dissolve those components and then you have to be able to transport them.
And so the water has to be transported. And I just think that the waste dumps being course material would -- the water would tend to more infiltrate rather than run off.
Q. Okay.
A. I'm not saying it wouldn't run off. There is potential. They weren't designed as total containment structures. They were designed to minimize the effects of runoff of sediment from leaving the site.
Q. When you say "infiltrate," you mean to the bottom of the --
A. Well, to -- water to -- rather than, if you think of a course medium being large rock, this out slope of this waste dump, water falls on it, you know, it's not like a sheet of plastic where water would just sheet off. It's going to hit this and it's going to, you know, move into that -- into that waste dump.
Q. Would it sort of migrate to the bottom and then out?
A. It potentially could, but I doubt it.

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There just probably wouldn't be enough runoff, enough rainfall, enough contributing area for that to occur. I'm not saying it's improbable or impossible or whatever.
Q. Good, I appreciate that.
A. We want to get into that discussion?
Q. No.
A. We could eat up the rest the time.
Q. It would stay -- it wouldn't evaporate, right, because it's internal?
A. Yeah, that's a good assessment.
Q. So it would accumulate over time. As more infiltrates it sort of builds up?
A. Yeah, it may. It may, yeah.
Q. Okay. But if it did run out it would run out on the toe and then downstream?
A. It would run out to the toe, it would then -- yeah.
Q. Okay.
A. Potentially.
Q. All right. Do you know what the amount of surface water runoff that currently occurs at the site? Have you done any testing on that?
A. The amount in terms of quantity?
Q. Uh-huh.

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A. Depends on what you have.
Q. One of the simpler ones, I suppose.
A. With a recorder and everything?
Q. No. You were describing a pipe.
A. Simple thing, so less than 100 bucks.
Q. Okay. So you're not, as I understand it, you don't know what the current amount of runoff is from the site?
A. I know it's minimal. I don't know the exact amount. I couldn't give you an exact, you know, CFS if that's what you're looking for.
Q. But you couldn't characterize, it has not been characterized?
A. It has been characterized as ephemeral, so it means that it only flows in response to storm events.
Q. Okay. Could you talk to me about your experience evaluating runoff and rainfall?
A. I have a degree in watershed science.
Q. Okay. So what kind of model method would you use to quantify that?
A. Where?
Q. Here.
A. Here?
Q. If you wanted to determine how much rain

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runoff occurred, what model would you use?
A. Depends on what -- if I'm trying to design a structure or I'm trying to determine the average annual rainfall or -- I don't know, I mean, you got to be more specific in terms of what I'm trying to do.
Q. If you were trying to set the baseline of the existing conditions?
A. In this particular situation I would just look at the fact that they're ephemeral drainages. I wouldn't have collected anything probably.
Q. Okay. If you wanted to quantify the difference between now and then, so the now being as it currently exists, and the then being after mining, would you be able to do that?
A. Possibly. But, you know, it would be for a specific event, for a specific storm event. It wouldn't be, you know, any point in time. You'd have to give me a specific rainfall event.
Q. I was referring to, let's say a year. Over the course of a year you wanted to know, do you know the difference in the water quantity now and after this mine is going to be in place?
A. Other than monitoring, I'm not sure that you could get an exact number. You could do a

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hypothetical based on a storm event. You could take like a ten-year, 24-hour storm, you could go to the NOAA atlas, you can get 2.2 inches of rainfall, you could plug that into a curve number analysis, whatever, you know, a rational formula, whatever formula you want to use to determine, you know, inches of runoff.

And you could take the different types of vegetation, say you have vegetation of, you know, rock outcrop, pinion juniper, grasses, versus a waste dump, and you might be able to determine there would be a difference in the actual runoff.

But it would be a -- it would be a hypothetical, you know, number. It wouldn't be an actual measured number. The only way you'd get an actual measured number would be if you had a gauge and you actually physically measured the amount of runoff.

Q. Do you know what the area of the impact of the mine is going to be? How large an area is going to be impacted?
A. Yeah.
Q. Can you tell me what that is?
A. I think it's 213 acres. Like 70 acres of waste dump, something like that, or 90 acres of process and top soil and all that.

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Q. Would you say most of that is going to be internally draining?
A. Yeah, I think so.
Q. Okay. Given that --
A. More than half.
Q. Pardon me?
A. More than half.
Q. Given that, would you say that there would be a noticeable change in the amount of runoff that will be coming from that site?
A. That's hard to say. I don't know if I could say that.
Q. Okay.
A. I mean, chances are there would be less, but I don't know if it would be -- you know, there would be a measurable. When you say "measurable," what does that mean, you know, depends on a lot of factors.
Q. Now, the surface will be disturbed. The entire surface will be disturbed?
A. Right.
Q. And so the runoff that occurs will be different in character, would you agree with that?
A. Oh, yeah, sure.
Q. All right. So just to be clear, there's

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silt fences, they use check dams, things of that nature to -- because until the actual facilities are built and everything is in the place of where it's supposed to be, they can't really, you know, define exactly where these ditches would be and things exactly.

Q. No, I understand.

A. And I think that was their purpose of doing this, was that they -- when they finally had everything figured out that they would submit plans to us and then we would approve those plans.

Q. So you would expect that to happen?

A. I definitely expect that to happen.

Q. Okay. All right.

MR. ALDER: Could we take a break for a minute?

MR. DUBUC: Certainly.

(There was a break taken.)

Q. BY MR. DUBUC: One of the things that just sort of punted by RUSLE had to do with some questions on the regional aquifer and stuff. Are you comfortable talking about that? Is that an area of expertise? I shouldn't use that -- is that part of your expertise is to talk about the regional aquifers? Are you versed with that?

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A. No.

Q. Okay. How about seeps and springs and that area, are you involved in that at all?

A. Other than I know what they reported on their map.

Q. But you have no --

A. Firsthand knowledge.

Q. -- firsthand knowledge or opinion on how water arrives at those seeps and springs from the mine?

A. I have an opinion, but it's not a profession -- you know, from a geologic I don't have the background to make that.

Q. So you can't talk about aquifers and such?

A. No. Left that to Leslie.

Q. Are you involved at all in the drilling of the holes?

A. No.

Q. Are you able to talk about the groundwater quality impacts?

A. No.

Q. So your discussion is limited to surface water?

A. Yes.

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Q. All right. Is there a correlation between surface water quality and groundwater quality in your estimation as a hydrologist?

A. Potentially.

Q. Do you know if that situation occurs at this site?

A. I can't conclusively say that, no.

Q. How familiar are you with the contents of the groundwater permit-by-rule?

A. I've seen it.

Q. Have you analyzed it?

A. In what regards? Other than reading it, digesting it.

Q. As a hydrologist have you?

A. Yeah, I have.

Q. Just in relationship to surface water, I mean, it's a groundwater --

A. Well, I --

Q. How does that work?

A. It had some surface water stuff, you know, discussed some surface water stuff in there. I was interested in the groundwater aspects of it. I, you know, I think it's -- I look at everything in a global perspective. I mean, none of these things are isolated from one another, you know.

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I mean, you can't just parse out surface water and groundwater and -- they are interrelated, in a sense, even though, you know, because water obviously came from the sky, went into the ground, came out as groundwater. Had to come from somewhere.

Q. So you -- when you look at something like the tailings piles, dumps, however you want to characterize them, are you able to make an informed assessment of the characteristics of those? Is that part of your expertise?

A. That's not part of my expertise.

Q. Okay. Did you analyze the -- when you look at the groundwater demonstration, did you look at it in terms of comparing it to the mine plan and whether it matched?

A. Being part of the mine plan it's incorporated. There may be references in here that I'm not aware of that don't match, but as a rule I thought it did.

Q. Did you notice any discrepancies in that?

A. I didn't. Not offhand.

Q. Okay. You have that in front of you?

A. I do.

Q. On Page 4, what is the pit size that is outlined?